

Project Title:

The acceleration and propagation of energetic particles at the Sun and in the inner heliosphere

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Project Information:

Our proposed studies focus on understanding the solar and interplanetary components of solar energetic particle (SEP) events, the effects of the interplanetary medium on SEP events, and whether it is possible to develop a semi-empirical model to predict the properties of shocks at the Earth based on SEP events. Particular emphasis will be placed on trying to determine whether flares play any role in major particle events, in view of our recent work on the relationship of SEP events and a specific class of type III radio bursts which suggests that the current understanding in terms of only one acceleration mechanism (shock acceleration) is inadequate. We will characterize the particle compositions early in a large number of well-connected events, compare these with the compositions of impulsive events, and assess whether they are dependent on the characteristics of the associated "flare" phenomena. We will also use an existing extensive database of interplanetary shocks and particle events, and their solar associations, during the last 35 years that we have developed to understand the large-scale structure of interplanetary shocks, and the implications for particle acceleration. This database will be made available to the community as part of the project. Our studies will use extensive observations from the current solar cycle and from previous cycles, in particular from cycle 21 when multiple spacecraft were present in the inner heliosphere.

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